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Removal Action Work Plan
Crawford Station MGP Site
Chicago, Illinois

Revision 1
September 6, 2011

Project No.: 2037

NATURAL RESOURCE TECHNOLOGY

ENVIRONMENTAL CONSULTANTS

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REMOVAL ACTION WORK PLAN

CRAWFORD STATION MGP SITE
CHICAGO, ILLINOIS

Project No. 2037

Prepared For:

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Chicago, IL 60601

Prepared By:

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Revision 1
September 6, 2011

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1 INTRODUCTION

1.1 Overview

This *Removal Action Work Plan (RAWP)* pertains to a portion of the former Crawford Station Manufactured Gas Plant (MGP) site in Chicago, Illinois (Figure 1). Peoples Gas Light and Coke Company (PGL), a subsidiary of Integrys Energy Group, owned the former MGP. Integrys Business Support, LLC (IBS) will manage the removal action on behalf of PGL. PGL and United States Environmental Protection Agency (USEPA) entered into a Settlement Agreement and Administrative Order on Consent (Settlement Agreement), CERCLA Docket No. V-W-08-C-917, effective October 31, 2008, to perform Remedial Investigation/Feasibility Study (RI/FS) activities at four PGL Sites, including the Crawford Station under the Superfund Alternative Sites Program.

The Crawford Station MGP site is comprised of approximately 260-acres of industrial land located west of South Pulaski Road, north of the Chicago Sanitary and Ship Canal, east of the Chicago and Western Indiana Belt Line Railroad and south of a railroad yard and other industrial properties. Investigation work on various parcels comprising the Crawford Station MGP site has been ongoing since approximately 2001.

Although a complete RI/FS has not been completed to-date, the preliminary investigation steps identified MGP source material on Parcels A, B, and O, some of which is present at or near the ground surface and may present a potential exposure risk. USEPA requested via correspondence dated March 24, 2011 that IBS develop a work plan to conduct an emergency response (time critical) removal action, pursuant to Paragraph 37 of the Settlement Agreement.

This RAWP is intended to outline the scope of the proposed removal action to be undertaken in response to the directive from USEPA and will serve as the statement of work for a final Administrative Order on Consent (AOC) between USEPA and PGL pertaining specifically to this removal action.

The removal action addressed by this RAWP is focused on removing MGP residuals that have been characterized as source material that pose a potential exposure risk. The removal action encompasses only one portion of the Crawford site and is intended as an interim action to address exposed and subsurface MGP source material. IBS intends to accomplish substantial work on the referenced parcels,

such that the removal action will contribute to the overall site remediation goals under the RI/FS Settlement Agreement.

1.2 Project Background Information

Regulatory Contact:	United States Environmental Protection Agency Region V Ross del Rosario, Remedial Project Manager 77 West Jackson Boulevard Chicago, IL, 60604
Project Contact:	Integrys Business Support, LLC 130 East Randolph Drive, 22nd Floor Chicago, IL 60601 Naren M. Prasad, P.E., MPH, LEED AP Senior Environmental Engineer (312) 240-4569
Site Name:	Former Crawford Station MGP Site
Site Location:	3500 S. Pulaski Road, Chicago, IL Section 34, Township 39 North, Range 13 East in Chicago, Cook County, Illinois. (Figure 1)
Location of Removal Action Area:	Lat. 41° 29' 29.007" N Long. 87° 44' 14.011" W
EPA ID #:	ILN000510192
EPA Registry ID:	110030434331
Environmental Consultant:	Natural Resource Technology, Inc. (NRT) 311 South Wacker Drive, Suite 1670 Chicago, Illinois 60606
NRT Project Contact:	Mr. John M. Nardozzi, P.E. Principal Engineer (312) 465-1740 x2102

1.3 Site History

In 1921, the Koppers Company of Pittsburgh and PGL entered into an agreement whereby Koppers built and financed the Crawford Station MGP site. Under the terms of the contract, the Chicago By-Product Coke Company was formed to own and operate the plant. PGL then bought gas and coke manufactured at the plant for distribution to consumers. PGL acquired the Chicago By-Product Coke Company in 1938. Initial facilities at the site included 105 coke ovens (increased to 151 coke ovens between 1948 and 1950), nine water gas sets and two 10 million cubic foot water-seal gas holders. In the 1930's a light oil refining plant and a liquefied petroleum gas peak shavings facility were added to the Crawford Station and five of the nine water gas sets were converted to produce reformed natural gas and later oil gas. Forty liquefied petroleum tanks were installed in 1957. The former Crawford Station produced coke oven, carbureted water and reformed natural gas. The gas manufacturing processes used at this site resulted in the production of by-products. These by-products were stored in tanks on-site and were frequently sold to other companies for direct use or for conversion into other products. By 1956, the Crawford Station was only used to supply gas and coke when the demand was high. Production was temporarily halted between 1958 and 1962 and permanently after 1963. Dismantling of the station began in 1956 starting with portions of the coke oven plant. The remainder of the station, including the two 10 million cubic foot gas holders were dismantled and the plant was retired in 1965. PGL sold 146 of the original 260 acre site to First Industrial Realty Company in 1966.[1]

1.4 Site Description

The Crawford Station MGP site is located in the West Township of the City of Chicago, in the County of Cook and is approximately 260 acres. The site is bound to the north by a railroad yard and industrial properties, to the east by South Pulaski Road, to the south by the Chicago Sanitary and Ship Canal and to the west by the Chicago and Western Indiana Belt Line Railroad. The address associated with the Crawford Station MGP site is 3500 South Pulaski Road, Chicago, Illinois. The entire Crawford Station MGP site is referred to herein as the parent site.

[1] The Former Crawford Station Manufactured Gas Plant, Property O, Chicago, Illinois, Site Investigation Report, Burns & McDonnell, June 2002 (Appendix A3).

The Crawford Station MGP site has been subdivided into 21 parcels[2], designated as Parcels A through U (Figure 2). The individual parcels have multiple owners. Previous investigation activities, as discussed below in Section 1.6, were performed consistent with the site boundaries of the individual parcels. The three key parcels that are the subject of this RAWP include Parcels A, B and O. Information regarding these parcels is summarized as follows:

Summary of Site and Parcel Information

Name	Size (acres)	Ownership
Crawford Station MGP Site	260 (nominal)	Multiple site owners
Parcels A & B	35.0	Peoples Gas Light and Coke Company
Parcel O	35.1	Peoples Gas Light and Coke Company
Removal Action Area (RAA) (Portions of Parcels A, B & O)	13.7	Peoples Gas Light and Coke Company

1.5 Definition of Removal Action Area

The area of the Crawford Station MGP site that is the subject of this RAWP is approximately 13.7 acres and has the geographic coordinates of Latitude 41° 29' 29.007" North, Longitude 87° 44' 14.011" West. This Removal Action Area (RAA) is irregular in shape and is comprised of portions of Parcels A, B, and O. The RAA is located in the southwest corner of the former Crawford Station MGP site generally bounded to the west by the Chicago and Western Indiana Belt Railroad and to the south by Parcel S of the parent site. Parcel S is a long narrow parcel that is adjacent to the Chicago Sanitary and Ship Canal. Parcel S is currently owned by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).

Figure 2 illustrates the location of the RAA in the context of the entire Crawford Station MGP site as well as the parcels that comprise the parent site.

[2] The term "Parcel" is used herein to define the subdivisions of the former Crawford Station MGP site. Prior site investigation reports, as identified in Section 1.6, generally used the term "Property" for this purpose.

Key features of the RAA are as follows:

- Generally unimproved open land with grass cover and some scrub trees. Surface topography is generally flat; however a slight depression exists along the approximate boundary of Parcels A & B and Parcel O.
- Natural gas utilities within the removal area and adjacent zones include a series of four high pressure gas mains ranging in size from 24-inch to 42-inch diameter. The gas lines traverse Parcel O and run parallel to the Chicago Sanitary and Ship Canal. At the western limits of Parcel O, two small gas regulator structures are present.
- A large sewer main, owned by the City of Chicago, traverses Parcels B and O in a north to south orientation. The sewer is 18 feet wide by 14 feet 4-inches high and has a cover depth of approximately six feet in the vicinity of the removal area.
- Small storage shed (metal structure) used by PGL for storage of empty drums.
- A private access roadway that traverses Parcel O is used by PGL to access the pipeline corridor.

1.6 Previous Investigations

Environmental assessment of the Crawford Station MGP site started in 1992 and intrusive site investigations were initiated in 2001. Site investigation activities were focused on selected parcels that comprised the parent site based on their ownership status and availability for investigation. The following table summarizes the investigation reports and data sets for the RAA parcels.

Summary of Prior Investigation Reports

Report Title	Prepared By	Date	Appendix
Preliminary Site Investigation Crawford Station	Hanson Engineers	February 1992	N/A
The Former Crawford Station MGP – Properties A & B, (XTRA Intermodal) Site Investigation Report	Burns & McDonnell	July 2001	A1
Supplemental Site Investigation Data – Properties A&B (Data Only, No Report)	Burns & McDonnell	April 2005	A2
The Former Crawford Station MGP – Property O Site Investigation Report	Burns & McDonnell	June 2002 (Draft)	A3
Site Investigation Activities at Crawford Parcel O (Letter Report)	Burns & McDonnell	March 2011	A4

The prior site investigation reports prepared by Burns & McDonnell have been compiled and are reproduced in Appendix A. The previous site investigation efforts identified the presence of MGP source material in the southwest area of the Crawford Station MGP site as described below.

1.6.1 Parcels A & B

In the July 2001 Site Investigation Report (SIR), it is cited that odors, staining and small to large amounts of tars were observed in three separate areas of Parcel A & B. The area in the southwest section of the site, straddling the property boundary with Parcel O, was classified as source material. This area was characterized by a hard layer of tar saturated soils at ground surface to about 4 feet below ground surface (bgs). In addition, investigation findings indicated the presence of tar appearing in fractures in the brown/grey silty clay. The tar in fractures was noted as occurring at a depth of 8 to 13 feet bgs and averaging about 2 feet thick. The southwest area of impact is within the proposed RAA as defined by this RAWP.

A second area of impact, identified as the North Central Impact Area, was located on Parcel B to the north of the southwest area of impact. This area was characterized as having coal tar in fractures of silty clay at depths ranging from 15.5 to 16.5 bgs, green staining at depths between 7 and 13 feet bgs, suspect naphthalene odors within wood fill materials, and elevated benzene concentrations, ranging from 0.324 mg/kg to 519 mg/kg, in subsurface soils. Surface soils were found to exhibit low concentrations of benzene, ranging from non-detect to 0.009 mg/kg. Field observations included odors, staining and small amounts of free product. The North Central Impact Area, while containing tar in fractures, presents no immediate exposure risk based upon the isolated occurrence, depth of the impacted material (below 15 feet bgs), and low concentrations in the surface soils. Accordingly, this area is not included within the RAA addressed herein.

The third area highlighted in the 2001 SIR is located to the north of the southwest area of impact and west of the north central impact area. The area was characterized by soil boring SP-086 and was not classified as source material; however, coal tar odors and tar were observed in fractures of the brown/gray silty clay layer from 10.5 to 12 feet bgs. Based on the findings presented, this area was not incorporated into the RAA as no immediate exposure risk was identified.

In general, it was noted that MGP-related constituents apparently were migrating mainly through fractures in the brown/gray silty clay unit.

The three principal areas of concern noted above are depicted on Figure 7, Significant Findings Map, of the 2001 SIR. The entire SIR is provided in Appendix A1.

In 2005, Burns & McDonnell conducted supplemental site investigation activities on Parcels A & B. This work comprised the advancement of an additional 50 soil borings (SP-099 through SP-149). The work was documented by boring logs, laboratory analytical reports and a boring location figure identified as Crawford A&B Summary of Further Delineation Results. This document is reproduced in Appendix A2.

1.6.2 Parcel O

A draft SIR for Parcel O of the Crawford Station MGP site was prepared in June 2002. Based on the investigation activities, three areas of the site were identified that exhibited odors, staining and various amounts of tar on Parcel O. The first area in the southwest section of the site was the largest and contained tar saturated sand (9 to 10 feet bgs) as well as observed tar in fractures one to two feet below initial tar saturated sand in the brown/gray silty clay. It was noted that the tar in fractures typically ended between 15 to 16 feet bgs. The draft SIR concluded that this area of the site contained source material. This southwest area of impact straddles the boundary line between Parcels A & B and Parcel O. Accordingly, the southwest area of impact on Parcels A & B and the southwest area of impact found on Parcel O are considered one potential source area for the purposes of this RAWP.

Two additional areas on Parcel O are highlighted in the 2002 draft SIR as exhibiting MGP-related impacts. One area was located on a small strip of land north of 36th Street, approximately 300 feet south of 35th Place; the other area of note was in the eastern section of the site near Pulaski Avenue. Neither of these areas was classified as containing source material and neither is incorporated in this RAWP for removal action at this time.

The three areas of concern noted above are depicted on Figure 7, Summary of Findings Map, of the 2002 SIR. The entire draft SIR is provided in Appendix A3.

In 2011, Burns & McDonnell performed additional site investigation work on Parcel O. This supplemental investigation work included advancement of 11 soil borings in the western area of the site (SP-131 through SP-140). The purpose of these borings was to further delineate the extent of MGP-related impacts in the western portion of Parcel O based on visual observations. The supplemental report concluded that the extent of tar found in surface and subsurface soils extends from the western property boundary to the middle of the turnaround area to the south of the access road. Results from the

delineation efforts were compiled into a letter report dated March 16, 2011. This documentation is presented as Appendix A4.

1.7 Prior Remedial Activities

No significant remedial activities have been previously performed at the Crawford Station MGP site. Some incidental removal work has reportedly been conducted associated with the relocation of an overhead electrical line to an underground line on Parcels A and B. In addition, limited soil excavation and off-site disposal of impacted material (approximately 45 cubic yards) was performed on Parcel O in conjunction with a gas pipeline improvement project.

2 SUMMARY OF SITE CONDITIONS

2.1 Site Geology and Hydrogeology

Based on site characterization work performed by Burns & McDonnell[3], the geological setting of the site is described as follows:

- Fill Unit - The RAA is characterized as having 0 to 9 feet of fill material, averaging approximately 6.5 feet in thickness. The fill consisted primarily of gravel and sand with smaller amounts of silt, clay, bricks, cinders, glass, and wood. Asphalt, where present, was approximately 6 inches thick with up to 2 feet of gravel/sand subbase.

- Brown/Gray Silty Clay Unit - Underlying the fill is a native layer of brown to brown/gray silty clay, up to 14 feet thick. The unit is a silty clay with a trace to some sand and gravel and often has orange mottling. The silty clay layer was identified in all deep soil probe locations in the RAA.

- Gray Silty Clay Unit - Underlying the brown/gray silty clay layer is a native gray silty clay unit presumably the Carmi Member of the Equality Formation. The top of the silt/clay unit was encountered from 10 to 15 feet bgs, averaging approximately 13 feet bgs. The silty clay unit is consistently made up of equal parts silt and clay with traces of sand and gravel.

Due to the variable groundwater conditions at the site and the large areas of fill, hydraulic conductivities are thought to be variable throughout the site. Estimated hydraulic conductivities for the soil types in the RAA are expected to be on the order of 1×10^{-6} to 1×10^{-2} cm/sec for the fill unit and 1×10^{-9} to 1×10^{-6} cm/sec for the underlying silty clay.

A survey of five identifiable monitoring wells near the RAA was conducted in May 2011. The groundwater elevation survey indicated that groundwater in the monitoring wells at the site is at variable depths between 0.55 feet and 9.20 feet. Groundwater elevations indicate that groundwater flows to the north. Figure 6 illustrates the estimated groundwater elevation contours.

The Chicago Sanitary and Ship Canal is the closest surface water body and is located adjacent to Parcel S which lies to the south (approximately 315 feet) of the RAA. According to the Illinois Environmental Protection Agency (IEPA), water quality within the Canal is generally poor. Survey stations upstream and

[3] The Former Crawford Station Manufactured Gas Plant, Property O, Chicago, Illinois, Draft Site Investigation Report, Burns & McDonnell, June 2002 (Appendix A3).

downstream of the site indicate that the greatest impact to water quality is from fecal coliform concentrations due primarily to waste water treatment discharges.

In the vicinity of the RAA, surface water runoff is expected to flow toward the southwest where it would eventually discharge to the Canal.

2.2 Pre-Removal Site Characterization Activities

Pre-removal site characterization activities, which included soil borings and test pit excavations, were conducted within the RAA by NRT in May 2011 with the following objectives:

- Assessment of former MGP foundation structures.
- Characterize various phases of MGP impact found at the site.
- Characterize the subsurface fill for excavatability considerations including side slope stability.
- Characterize material for waste disposal.
- Assessment of dewatering conditions and presence or absence of non-aqueous phase liquid (NAPL) associated with MGP residuals.
- Assessment of odors and air quality conditions for fugitive emission controls for full-scale implementation and preparation of an air monitoring plan during removal actions.

NRT advanced seven soil borings on each of Parcel O and Parcel B on May 13 and 17, 2011, respectively. Boring locations are illustrated as CS-O-SP-1 through 7 and CS-B-SP-1 through 7 as shown on Figure 5. Soil boring logs are presented in Appendix C1. On May 19, 2011, three test pit excavations, identified as TP-1, TP-2, and TP-3, were completed; their locations are illustrated on Figure 5. Test pit logs are presented in Appendix B1.

2.2.1 Field Observations

Data collection activities began with the advancement of soil borings CS-O-SP-01 through 07 on the southwest portion of Parcel O. Activities continued in the southern area of Parcels A & B with soil borings CS-B-SP-01 through 07. These borings were conducted to identify and assess subsurface conditions previously noted by Burns & McDonnell. The following stratigraphic units, listed in descending order, were identified at the site: fill, brown/gray silty clay, gray silty clay, consistent with prior investigations by others. Asphalt and a gravel/sand subbase are at the ground surface in a few locations.

As part of NRT's 2011 investigation, soil samples were collected from discrete intervals for laboratory analysis for petroleum volatile organic compounds (PVOCs) via Method 5035/8260, PAHs via Method 8270, and total petroleum hydrocarbons (TPH) via Method 8015. A larger number of samples were collected from similar phases of impacts for TPH for comparison with the samples previously discussed.

In addition to the soil borings, NRT completed three test pits on Parcels A & B to assess excavatability, water infiltration, and potential for odors. This information as collected to aid in planning the excavation work and developing an appropriate fugitive emission control plan for the removal action. Test pit logs are presented in Appendix B1.

All test pits were completed to approximately 15 feet below ground surface and were approximately three feet in width. Walls of the excavation were notably stable with little to no cave-ins or collapses observed. The first test pit (TP-1) was allowed to remain open for approximately eight hours to observe the in-flow of groundwater in the excavation. A very limited amount of water infiltrated from the 4 to 5 foot horizon at the end of the day small, shallow pockets of water were observed on the floor of the excavation. The eastern test pit (TP-2) exhibited amounts of water infiltrating from the 4 to 5 foot horizon sufficient to cover the floor of the excavation with approximately six inches of water.

A composite soil sample from the test pit were collected and analyzed for landfill waste characterization parameters. In addition, one sample was collected from the NAPL saturated layer observed in the southwest portion of TP-2 for laboratory analysis for TPH. The laboratory analytical reports from Pace Analytical for these soils are presented in Appendix C2.

2.3 Utilities and Site Constraints

2.3.1 Existing Utilities

2.3.1.1 High Pressure Gas Mains

A series of four high pressure gas mains traverse Parcel O, running along the south portion of the parcel. The gas mains enter the site near the southwest corner of Parcel O and are generally oriented parallel to south property line. The four high pressure lines consist of two 42-inch diameter, one 36-inch diameter and one 24-inch diameter mains. The incoming gas mains are reportedly owned by Natural Gas Pipeline Company of America, in the vicinity of the RAA. PGL operating procedures require that any excavation work to be a minimum of 2'-0" from the gas mains unless hand excavation techniques are employed by PGL personnel.

2.3.1.2 Sewers

A large sewer main traverses the RAA in a north-south orientation. The sewer is reportedly 14 feet 4-inches high by 18 feet wide and is located within a 30 foot wide easement dated 1938 as shown on Figure 7. The sewer is under the jurisdiction of the Chicago Department of Water Management and is referred to as the Kostner Avenue sewer. Another major interceptor sewer is located immediately south of the Parcel O site boundary on Parcel S as illustrated on Figure 7. This sewer is referred to as the West Side Intercepting Sewer and is owned by the MWRDGC.

2.3.1.3 Overhead Utilities

There are no overhead utility lines on-site in the vicinity of the RAA.

2.3.2 Site Ownership

As noted in Section 1.4, PGL owns Parcels A, B and O. The RAA is located within the southern portion of Parcels A & B and the western portion of Parcel O. The northern portions of Parcels A & B, outside the RAA, are leased to XTRA Intermodal.

2.4 Soil Data Compilation and Interpolation

NRT utilized Geographic Information System (GIS) tools[4] to perform geospatial analysis on the historical and recent analytical site data. Data were compiled into manipulatable formats and were subsequently imported and geospatially referenced using satellite imagery and aerial photography[5]. Integrity of the data is managed through the use of a file geodatabase system and is maintained using common geospatial data management best-practices.

[4] ESRI ® ArcMap™ version 10.0 SP2 Desktop GIS software.

[5] Sources include: ESRI, i-cubed, USDA FSA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGP, (c) 2010 Microsoft Corporation and its data suppliers, and the US National Park Service). Geospatial data was mapped using the North American Datum 1983, State Plane Illinois East (feet) coordinate system.

The interpolated data were evaluated as part of the removal action planning for purposes of:

1. Assisting with determining the extent of the excavation area. The excavation limits are primarily defined based on descriptions of visual NAPL identified as MGP source material as described in Section 3.2. Soil analytical data was used to correlate visual indicators of NAPL. The potential extent of excavation was expanded to include areas within the RAA where historic soil concentrations of benzene and naphthalene indicated potential source material. Benzene and naphthalene are representative of BTEX and total PAHs, respectively, which are the primary constituents of concern (COCs). The visual descriptions of NAPL as well as associated analytical data were coordinated into a three-dimensional interpolation of the source material in each designated depth interval (i.e., 0-2 ft, 2-4 ft, 4-6 ft, 6-8 ft, etc.) at each historic and recent soil probe and test pit location (Appendix A2, Figures 3 and 4).

2. Targeting the soil amendment area, within the established RAA. The excavation was then subdivided into areas where soil will likely require amendment based on available site data in order to satisfy disposal requirements for the selected Illinois Subtitle D landfill. Areas with similar descriptions of NAPL were included and were used to interpolate the three-dimensional volume of material that is expected to require amendment prior to off-site disposal.

The output includes the total volume of material to be removed from the RAA. Excavation areas are presented in Figure 7 and discussed further in Section 3.3.

2.5 Characterization of Material for Disposal

Results from several samples collected in the RAA indicate or potentially indicate toxicity characteristic leaching procedure (TCLP) benzene concentrations greater than 0.5 mg/L, the allowable limit based on Illinois's Subtitle D solid waste landfill permit criteria.

Under applicable state regulations (Title 35, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter c: Hazardous Waste Operating Requirements, Section 721) TCLP analysis for benzene at MGP sites is exempt from toxicity characteristic requirements.

Soils that have been found to exceed or are likely to exceed the 0.5 mg/L limit will be amended with wood chips and re-sampled prior to their acceptance at an Illinois Subtitle D landfill as further described in Section 4.4.

2.6 Risk to Public Health, Welfare or the Environment

Based on the historic site investigation data, and recent supplemental site characterization sampling, the conditions present at the southwest portion of the former Crawford Station MGP site may constitute an imminent risk to public health, welfare, and the environment based upon the factors set forth in the National Contingency Plan (NCP) Section 300.415(b)(2). The potential risk posed could increase if PGL implements plans to increase the level of activity and frequency of use of this portion of the site in the future. Selected factors that were deemed applicable to this determination are as follows:

1. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

   This portion of the site is within an area used for industrial activities, but no active operations are conducted in the vicinity of any exposed MGP residual materials. Typical security measures, including fencing, are employed, limiting any actual exposure.

   A potential exposure risk is present within the proposed RAA because of the existence of exposed MGP residual materials including weathered tar at ground surface at multiple locations. The locations of weathered tar exposed at the ground surface include the turnaround area adjacent to the access roadway leading to the gas regulator structures on Parcel O. Further, an area of exposed MGP residuals was documented on Parcels A & B near the far western boundary of Parcel A.Subsurface migration of contamination is a potential threat to additional receptors; however, based upon previously conducted site characterization work, the mobility of the MGP residuals in subsurface soils is considered low.

2. Elevated levels of hazardous substances or pollutants or contaminants in soils at or near the surface that may migrate.

   As stated above, MGP residuals meeting the classification of source material were identified at the ground surface. The MGP residuals exhibit elevated concentrations of PAH constituents and PVOCs.

   A quantitative risk assessment of the detected concentrations of the constituents of concern was not conducted as part of prior investigations or during the preparation of this RAWP.

Given the site conditions, the nature of the known and suspected hazardous substances, pollutants or contaminants within the RAA, and the potential exposure pathways described above, actual or threatened releases of hazardous substances, pollutants or contaminants from the RAA are evident. Removal of these MGP source materials will effectively mitigate the direct contact exposure pathway and reduce the potential for migration to soil, groundwater or surface water. If not addressed by implementing the response actions selected in this RAWP, or by another comparable mitigation method, these conditions pose a potential risk to public health, welfare, or the environment.

3 BASIS FOR REMOVAL ACTION

3.1 Removal Action Objectives and Strategy

The overall objectives for the removal action described in this RAWP are as follows:

1. Remove MGP source material identified within the defined RAA to eliminate residual MGP NAPL at surface and associated direct contact concerns to the extent practicable;

2. Remove other materials which may be impacted by MGP residuals, but are not considered source material, on a selective basis within the RAA to support long term site management within the Multi-Site framework and avoid future excavation below or immediately surrounding the RAA.

3. Restore the site by replacing removed material with clean fill, or utilize available on-site material such as overburden that is demonstrated not to meet the criteria of source material.

The removal action has been developed in consideration of the following strategy:

- Selection of a remedial technology that can be implemented within a short time frame and not adversely affect the nearby high-pressure gas lines;

- Utilize a planning and design process that addresses only MGP source material which has been defined by prior investigations, but avoids protracted additional investigation or characterization efforts; and

- Limit the overall scope of the removal action to the area of the parent site where immediate implementation is feasible considering issues such as property ownership, access constraints and practical considerations.

Based on these considerations, subsurface conditions and site constraints, the removal strategy selected to achieve the removal action objectives includes excavation and landfill disposal. This approach relies on a strategy of removing MGP source material to mitigate the potential exposure risk resulting from MGP source material at ground surface as well as minimizing the potential for migration of MGP residuals to surrounding soils, groundwater and/or surface water.

Based on available site investigation data, non-MGP related contaminant sources are not expected to be encountered within the RAA. In the event obvious non-MGP related contamination is evident during the removal action (such as buried drums, previously unidentified underground storage tanks (USTs), or other types of impacts that are visually distinct from the MGP source material) appropriate procedures will be employed to address such contamination and/or environmental concerns in accordance with federal,

state and local requirements. As appropriate, the USEPA On-Scene Coordinator (OSC) would be promptly notified. If the type of contaminant(s) encountered is not consistent with the site investigation data or waste profile for the site, supplemental sampling and waste characterization will be performed to ensure proper management, handling and disposal of the material. The health and safety plan will likewise be reviewed to assess whether changes to the Health and Safety Plan (HASP) procedures are warranted.

3.2 MGP Source Material Definition

As a time critical action, the proposed removal action is being conducted without a complete RI/FS or quantitative risk assessment. To accomplish the project objectives in a timely manner, the removal action will be based primarily on visual assessment methods, complimented with post-excavation screening level sampling as described in Section 6.4.3. The need to proceed expeditiously with the removal work lends itself to the selection of conservative remedial technologies and approaches that have demonstrated effectiveness in similar situations.

For the purposes of this RAWP, the MGP source material that will be addressed by the removal action is defined as follows:

MGP Source Material Description

Descriptive Term	Soil boring log descriptions from prior investigation work[6]	Definition
Tar at ground surface	Tar at surface	Areas were visible tar is on ground surface
Oil Wetted	Tar saturated Free product	Visible brown or black oil wetting the soil sample; oil appears as a liquid and is not held by soil grains.
Oil Coated	Tar coated Hard tar	Visible brown or black oil coating soil particles; typically associated with coarse-grained soil such as coarse sand, gravel, and cobbles.

[6] Correlation of previous soil boring log descriptions based on most recent field observations.

Areas exhibiting lesser degrees of noted NAPL (i.e., tar in fractures, oil staining in fractures, etc.) will not be considered MGP source material and their removal is not an objective of this removal action. To accomplish the excavation of MGP source materials, other non-source material soils are expected to be encountered during the removal activities; these materials will be managed as outlined in Section 4.4.

3.3 Removal Action Decision Criteria

Based on the site investigation activities completed to date, remedial objectives, and the existing site constraints, the following decision criteria are applied to the proposed removal action:

a. Excavation will be limited to the southwest portion of Parcels A & B and Parcel O within the defined RAA as shown on Figure 3. PGL owns these portions of the site. The northern portion of Parcels A & B and eastern portion of Parcel B (demarked by an existing chain link fence) are excluded from the removal activity as these areas are leased to a third party that operates an active intermodal trucking company.

b. To accomplish the objective of eliminating the potential risk associated with the presence of MGP source materials, as defined in Section 3.2, the scope of the removal action will include:

    i. Removal of MGP source material within the top three feet of the ground surface (0 to 3 feet bgs) to mitigate the direct contact exposure pathway.

    ii. Removal of MGP source material to depths of up to 10 feet bgs to mitigate potential exposure to future construction workers.

c. To the extent practicable, IBS will remove MGP source materials at depths greater than 10 feet where such removal is practically achievable and cost effective. Consideration of the practicality of such deeper excavation will be based on factors including, but not limited to: 1) relative size of the impacted area (i.e. small stringers of source material or tar in fractures will not be excavated), 2) ability to efficiently excavate materials within the limitations of available excavation equipment, 3) ability to excavate without inordinate groundwater dewatering, and 4) schedule or time constraints. It is presumed that achieving source material removal at depth during this phase of work will be more cost effective than after the site-wide RI/FS is completed and a quantitative risk assessment is performed. Based on the available data set, 16 feet is the greatest depth at which soil removal is planned.

    Following excavation of visually identified source material, verification sampling will be conducted to document the removal action. Residual soils will be sampled for selected MGP COPCs and TPH as indicators for source material, based on the rational stated and in accordance with sampling protocols described in Section 6.4.3.

d. At locations were post-excavation sampling results indicate that residual soil concentrations are near the allowable criteria for source material (i.e. greater than 75% of C_{sat} or 75% of the soil attenuation capacity), IBS will consider the application of in-situ chemical oxidation (ISCO) products to effect further reduction in contaminant levels and mitigate the potential for migration of impacted groundwater from the source area. The application of ISCO will be field determined based on the sample results obtained and field judgement considering the depth of excavation, proximity to the

groundwater table, and other site constraints. As a safety precaution, ISCO will not be applied in proximity to the high pressure gas mains or within the sewer easement.

e. The presence of existing high pressure gas mains presents a unique site constraint and potential safety issue. Due to safety considerations, excavation will not be performed within 7 feet of the gas mains. Accordingly, MGP source material lying above the gas mains (estimated at approximately 0 to 4 feet bgs) will be removed by hand. No attempt will be made during this removal action to access soils below the crown of the gas mains. In addition, work will not be performed within 10 feet of the gas regulating buildings that are present on Parcel O.

f. A large sewer main is also present in the removal area. Due to the large size of the sewer and based on structural considerations, it is deemed impractical to remove potential MGP source material that may be present in the soils immediately adjacent to or underlying the sewer. Source material lying above with sewer will be removed to a maximum depth of approximately 6 feet bgs within the 30 foot wide sewer easement, assuming access to these soils is authorized by the City of Chicago. No excavation below this horizon nor below the sewer line is anticipated during the proposed removal action. The need for additional investigation of this sewer will be be determined during the remedial investigation stage of the project which will occur after the Removal Action.

3.4 Estimated Removal Volume

Based on the project objectives and decision criteria, the approximate lateral and vertical extents of MGP source material to be removed are shown on Figure 7. Details of the removal plan are presented in Section 4 and include the following materials and estimated volumes:

- The total volume of MGP source material planned for off-site disposal is estimated between 130,000 to 150,000 cubic yards (220,000 to 255,000 tons).
- Total volume of overburden material which will be excavated and reused as backfill is estimated between 20,000 to 28,000 cubic yards (34,000 to 48,000 tons).

4 REMOVAL ACTION IMPLEMENTATION

This section describes the components of the removal action plan that will be implemented within the designated RAA located on Parcels A, B and O of the Crawford Station MGP site.

4.1 Preliminary Activities

4.1.1 Site Security and Controls

PGL currently maintains a gated and secured entrance to its facility at 4161 West 36th Street, Chicago, Illinois. This secured entrance will serve as an access point to the RAA. Security personnel are present at Crawford Station 24 hours a day, 7 days a week.

Prior to commencing the removal actions, a temporary chain link fence will be installed around open areas in the vicinity of the RAA (i.e., along the railroad right-of-way) to prevent unauthorized access to the RAA. The fence separating Parcels A, B and O within the RAA will be removed and replaced (if needed) upon completion. The remaining portions of the existing chain link fence in the vicinity of the RAA will not be altered and continue to secure the RAA from the general public. The temporary fence will be an 8-foot high chain link fence with a visual barrier. A secondary gated entrance will be installed along the haul road adjacent to the RAA. This gate will be locked when no site workers are present.

All visitors will be required to sign a visitor's log when entering and exiting the RAA. Access to active construction areas will be limited to authorized personnel approved by IBS who will be required to participate in a site-specific health and safety briefing by the site supervisor or health and safety officer prior to entry.

4.1.2 Surveying

At a minimum, the following items will be surveyed:

- Stake out of the proposed removal areas and soil amendment areas.
- Property boundaries in the vicinity of the RAA including the adjacent south property owned by MWRDGC (Parcel S) and the adjacent railroad property.
- Existing utilities within or in the vicinity of the RAA.

- Final lateral extents and depths of the removal areas.
- Final site improvements and surface elevations within the RAA.

4.2 Site Preparation

Site preparation will include protection of utilities to remain in-place, installation of erosion controls, clearing and grubbing of vegetation, and establishing a truck route at the site including construction of an on-site temporary truck access road. Several trees near and within the RAA limits will be protected from construction activities to the extent practical. In addition, monitoring wells MW02 and MW07 will be protected from construction operation activities. Concrete barricades or steel traffic bearing plates will be placed around or on the wells. These activities are discussed further below and illustrated on Figure 8.

4.2.1 Protection of Utilities and Construction Utilities

Several underground utilities are located within the RAA. Coordination of all utility providers is required to protect the utilities which will remain in-place during excavation activities including four high pressure gas mains, 14'-4" by 18' concrete sewer main, and a 17'-6" diameter interceptor sewer (Parcel S). Discussions with PGL, Chicago Department of Water Management and MWRDGC on a proposed plan for protection of the utilities will be completed in advance of the initiation of the project.

Field modification may be necessary based on subsurface conditions encountered during construction. If utility modifications are necessary, PGL will coordinate with the utility provider. Additionally, coordination with utility providers will also occur to facilitate installation of utility services necessary for the construction operations. The construction operations will require, at a minimum, electrical and/or communication services for office trailers. In addition, the contractor's site superintendent will be specifically tasked with ensuring all utility conflicts are cleared as the excavation activity progresses. In the event that ISCO is used, special care will be taken to avoid its application in proximity to the sewer and/or high pressure gas mains.

4.2.2 Runoff and Erosion Control

Runoff and erosion control measures will be implemented in accordance with Title 35 Illinois Administrative Code Subtitle C, Chapter I and City of Chicago requirements. Prior to the commencement of site work, the following site erosion control activities will be performed:

- A tracking pad of open graded stone will be placed at the truck entrances to minimize off-site tracking of soil from truck tires.
- Silt fence will be placed along the west and south chain link fence.
- Material management and decontamination areas will be bermed on all sides to prevent sediment run-off.
- Filter fabric will be placed above existing storm sewer catch basins, if any exist within the RAA, to prevent sediment from entering the state waterways.
- Street sweeping will be employed, as necessary, to promptly remove potentially tracked materials on public right-of-ways or driveways.
- If necessary, additional measures will be taken to prevent run-on of surface water, particularly to prevent surface water contact with the RAA throughout the duration of project.

During the proposed work, installation methods and maintenance procedures for silt fence and catch basin inlet protection will follow best management practices. Trucks, grading equipment, and other construction vehicles will use the constructed tracking pad to minimize tracking of soil off-site. Throughout the project duration, erosion control measures will be maintained until permanent erosion control measures are in place.

The contractor will be responsible for implementing an adequate erosion control plan and compliance with all applicable requirements including conducting site inspections to:

- Document the conditions and/or repair of silt fences and/or catch basin filter fabric;
- Document sediment accumulation amounts adjacent to fences and/or on catch basin filter fabric; and
- Evaluate eroded or potentially unstable soils.

Inspections will be made on a weekly basis and within 24-hours after significant rainfall events (0.5 inches or greater), or as directed by the oversight engineer. Maintenance activities may include removal of sediment from fences and/or catch basin filter fabric, and repair as needed. Weekly inspection logs will be maintained at the site.

This erosion control plan will be further documented within the Storm Water Pollution Prevention Plan (SWPPP) to be prepared in accordance with the requirements of the NPDES General Permit for construction activities as discussed in Section 5.1.

4.2.3 Clearing and Grubbing

Clearing and grubbing will be performed following placement of temporary erosion control measures. Clearing and grubbing will include removing from within the limits of work any trees, shrubs, stumps, and roots. Cleared and grubbed materials may be chipped and reused on-site as an amendment additive or will be transported off-site for disposal. Former electrical poles will either be removed temporarily for future re-installation or permanently disposed.

4.2.4 Route of Ingress and Egress for Construction

Ingress and egress routes to the RAA will be confined to Parcel O, which is under PGL's control.

Following installation of the perimeter fence, improvements and extension of the existing access road will be made to facilitate truck traffic to and from the RAA. The improvements will generally consist of placement of an 8-oz non-woven geotextile and a 6 to 12-inch layer of stone, as shown on Figure 8. In areas where the haul road is extended, the top 12-inch layer of soils will be removed and graded to provide adequate truck access to the site and smooth the transition between the stone layer and surrounding ground surface.

During excavation activities, following temporary road construction, trucks will enter and exit the site from the main secured gate entrance located at 4161 West 36th Street, as previously mentioned above. At the gate, appropriate signage will be posted to identify entrances and exits. All trucks will be covered and covers will be securely fastened before leaving the RAA.

4.3 Fugitive Emission Control

Site activities could generate fugitive emissions during the removal action. Fugitive emissions include vapor, dust, odor and noise potentially generated by site operations. A standard level of care will be taken to minimize fugitive emissions. Fugitive emission control measures may include the use of sheet plastic and/or water or foam-based vapor suppression agents. Sheet plastic may be used to provide a physical barrier to fugitive vapor and dust emissions specifically on inactive stockpiles or open excavations. Soil wetting using potable water with or without additives may be sufficient to control fugitive dust emissions from stockpiles, excavated areas, and access roads. A vapor suppression agent will be applied to open excavations and stockpiles of MGP impacted soil when necessary. Fugitive emission controls will be applied in accordance with the fugitive emissions management plan (refer to Section 6.2).

4.4 Removal Action Operations

Removal action operations will consist of the following elements as described in this section:

- Shoring
- Targeted Excavation
- On-site Materials Management
- Excavation Dewatering
- Equipment Decontamination

4.4.1 Shoring

For purposes of excavation stability, a sheet pile wall will be installed along the western boundary of Parcel A and along the southern extent of Removal Area A, as shown on Figure 9. An approximate 700-ft long sheet pile wall will be constructed immediately inside the property boundary. Dependant on site conditions and depth of proposed excavation, the sheet pile may vary between 20 and 35 feet in depth, and tiebacks may be required for stability. At a minimum, the sheet piles will be driven 1 foot into the Gray Silty Clay unit. Sheet piles will be driven deeper than 1 foot into the clay unit, as determined necessary, to provide excavation stability during the excavation process. At project completion, the sheet piles will be left in place as a vertical barrier to demark the removal area along the property boundary.

In addition, sloping of banks along the perimeter of the RAA will be required to stabilize excavation side walls as necessary to complete the excavation. Slope cutbacks will be in accordance with applicable industry standards and OSHA requirements.

4.4.2 Targeted Excavation

Excavation will be conducted in the RAA to achieve the removal of MGP source material as defined in Section 3.2 and utilizing the decision criteria outlined in Section 3.3. The following areas will be excavated, as shown on Figure 7:

- Green Areas: MGP source material is present within at least the top three feet and extending to depths up to 14 feet in selected areas. No overburden exists within these areas. Depth of each area varies based on soil borings, as indicated on Figure 7. These source materials will be removed pursuant to the decision criteria noted in Section 3.3, specifically items (b)(i), (b)(ii) and (c).

- Yellow Area: Top six feet is overburden material to be reused as backfill on site. MGP source material begins at approximately six feet bgs and extends to approximately 14 feet bgs. These source materials will be removed pursuant to the decision criteria noted in Section 3.3, specifically items (b)(ii) and (c).

- Orange Areas: Top eight feet is overburden material to be reused as backfill on site. MGP source material begins at approximately eight feet bgs and extends to approximately 16 feet bgs as shown on Figure 7. Source materials within this area will be removed to satisfy the decision criteria identified in Section 3.3, including items (b)(ii) and (c).

Overall the excavation process will occur in a staged progression, designed to effectively achieve removal goals but minimize duration of open excavations and allow for adequate access to the target removal areas. Phasing and sequencing of work will be further developed during the final design phase of the removal action. During excavation activities materials will be visually inspected for MGP residuals and segregated into four categories:

- Non-MGP impacted construction debris (i.e., pavement);
- MGP source material;
- MGP source material at or above the Subtitle D landfill permit limits; and
- Overburden material.

4.4.2.1 Non-MGP Impacted Construction Debris

Non-MGP impacted construction debris exhibiting no indication of impact by MGP residuals or other contaminants will be segregated and transported to a recycling or disposal facility. It is anticipated that non-impacted debris will be limited primarily to construction rubble associated with the existing pavement and chain link fences.

4.4.2.2 MGP Source Material

MGP source material will be directly loaded from the excavation to trucks for transport off-site or will be temporarily stockpiled within excavation areas to facilitate efficient loading of trucks.

If there is visual evidence of MGP source material particularly within the top three feet that is accessible within the RAA and considering the decision criteria (i.e., utilities, property boundary) as mentioned in Section 3.3, the source material will be removed.

As previously mentioned, the 14'-4" by 18'-0" concrete sewer main owned by the City of Chicago, will remain in place and excavation activities will extend up to the limits of the 30 foot wide sewer easement.

If permitted by the City, impacted soils overlying the sewer will be removed. Due to the depth of the sewer and structural considerations no excavation is proposed immediately adjacent to or underneath the sewer. However, this planned excavation requires approval of the City Department of Water Management to allow excavation activities within the sewer easement. Likewise, proposed soil removal above the gas mains will only extend to the top of pipe and no soil will be removed below the crown of the pipe. PGL will likely assist with the design and implementation of this excavation work around the gas mains based on safety considerations.

MGP source material will be transported by covered truck to an approved disposal facility as identified in Section 5.3.

4.4.2.3 MGP Source Material at or above the Subtitle D Landfill Permit Limits

Based on the available site characterization analytical data, potential MGP source material above the Subtitle D landfill acceptance criteria is expected to be encountered in isolated sections of the removal area. This material will be identified in the field based on existing site characterization data and waste profile samples. The material will be segregated into separate stockpiles denoted as the Amendment Area on Figure 9. A representative pre-disposal sample will be collected for laboratory analysis. Based on the laboratory results of the pre-disposal sample, the soil within the area will be removed and either be managed for landfill disposal, or be amended with wood chips and/or sawdust.

Of the total volume of MGP source material, a portion representing an estimated 30,000 to 50,000 tons is expected to require on-site soil amendment.

Following amendment, a representative sample will be collected for laboratory analysis to confirm amended soils satisfy landfill acceptance criteria for the Subtitle D facility. All laboratory analytical reports will be provided to the landfill, as necessary, for approval prior to transporting materials off-site.

4.4.2.4 Overburden Material

If during excavation there is no visual evidence of MGP source material (oil wetted or oil coated material) within any portion of the proposed removal area, the material will be considered overburden material and will be segregated and stockpiled on-site. Consistent with the objectives of this RAWP as stated in Section 3.1, overburden materials will be subject to field sampling to verify that MGP source material has

been segregated from the overburden. As agreed upon with USEPA, screening criteria will be applied consistent with the Illinois Tiered Approach to Corrective Action Objectives (TACO) regulations[7] for determination of soil attenuation capacity (Section 742.215) and soil saturation limit (Section 742.220) as accepted criteria for the determination of source contamination. The following sampling approach and screening criteria will be applied:

- Soil Attenuation Capacity – Overburden soil samples will be analyzed for TPH and compared to a default value of 2,000 mg/kg or a site specific soil attenuation value determined using the methods allowed under TACO.

- Soil Saturation Limits - Concentrations of the COPCs that are organic constituents with a melting point of less than 30°C will be evaluated in comparison to the default soil saturation limits as established in the TACO regulations. The specific parameters to be evaluated and the screening criteria to be used are summarized in Table 2. If deemed necessary, a site specific soil saturation limit may be determined using the methods allowed under TACO.

To ensure representative sampling is achieved, samples will be collected of overburden material and analyzed to verify compliance with source material criteria as described in Section 6.4.2.

Overburden soils will be reused as backfill of the excavation at depths below three feet if both of the above referenced screening criteria are satisfied. Overburden material that exceeds either the soil attenuation capacity or the soil saturation limits will not be used for backfill, but will be segregated and disposed of at the designated disposal facility.

4.4.3 On-site Materials Management

To facilitate proper segregation and staging of materials on-site during the removal action, the following staging areas will be set up as illustrated on Figure 9 and the following controls implemented:

- Overburden Staging Area: Material that can potentially be reused as backfill on-site will be stockpiled in this area. A polyethylene liner will be placed at ground surface and material will be stockpiled directly onto the liner. A silt fence or 9-inch high berms will be constructed around the perimeter to minimize potential storm water run-off. Inactive stockpiles (i.e.,

[7] Title 35 Illinois Administrative Code Part 742

material not added to or removed from stockpiles for 7 days) will be covered and/or stabilized with temporary plastic sheeting or alternate acceptable material to prevent erosion.

- Amendment Area: MGP source material at or above the Subtitle D landfill regulatory limit will be stockpiled and amended with wood chips or sawdust within this area. Amended soils will be stockpiled pending laboratory analytical results in this management area. The area will be constructed a low permeability working surface (e.g., asphalt pavement or polyethylene lined pad), a sump and berms.

- Decontamination Area: This area will be used to decontaminate construction equipment. The area will be constructed with a low permeability working surface, a sump and berms. Contaminated liquids generated within the berm of the material management area during decontamination activities will be managed similarly to the excavation dewatering treatment discussed below in Section 4.4.4 or otherwise contained and treated off-site. Phase separated liquids (if any) will be segregated for characterization and disposal.

- Clean Staging Area: Clean, imported fill materials may be stored in the Clean Stockpile Area. The Clean Stockpile Area will consist of silt fence or berms around the perimeter to minimize potential storm water run-off.

4.4.4 Excavation Dewatering

The excavations will be dewatered as needed to facilitate excavation activities. The excavation will be dewatered via a trench along the bottom of the excavation or via a down-hole sump(s) equipped with pumps of adequate capacity to accomplish the dewatering. Dewatering sumps may be constructed outside and upgradient of the excavation limits to reduce groundwater flow around the removal areas. The water will be pumped to frac tank(s) for solids settling. The water may either be directly discharged to a MWRDGC combined sewer on-site, or it will be pumped through a mobile pre-treatment system and then discharged to the sewer system, as approved by MWRDGC. If a pre-treatment system is required by the MWRDGC, it will likely consist of bag filters and granular activated carbon units.

Residuals resulting from the groundwater pretreatment system may include:

- Granular Activated Carbon (GAC);
- Bag or cartridge filters; and,
- Sediment from the frac tank(s).

Bag or cartridge filters and sediment will be profiled for landfill disposal. GAC may either be regenerated at a dedicated facility or disposed at a solid waste landfill after profiling.

4.4.5 Equipment Decontamination

Decontamination of equipment and disposition of decontaminated wastes will be performed in accordance with the Site-Specific Health and Safety Plan. All equipment will be decontaminated within the RAA. Final equipment decontamination, prior to demobilization, will consist of dry mechanical removal (scraping or brushing) of any loose material. Materials will be placed back into the removal areas or disposed of at the landfill.

Road trucks will not be allowed within the excavation limits as a measure to prevent off-site tracking of excavated materials. It is unlikely for the road trucks to require decontamination on a daily basis since they will not be allowed within the removal areas, and a tracking pad will be located at the truck entrance as an additional measure to prevent off-site tracking of excavated materials.

Excavation equipment visibly containing MGP-impacted materials will be decontaminated prior to being moved from one location to another, as necessary to control cross-contamination between overburden removal areas and MGP source removal areas. If pressure washing of equipment is required it will occur in the decontamination area on site. Decontamination water will be pumped from the area and disposed as wastewater, as previously mentioned.

Additional equipment decontamination procedures are described in the *Multi-Site Health and Safety Plan* (NRT 2007).

4.5 Site Restoration

As mentioned previously, overburden materials will be used as appropriate for backfill within the RAA. The overburden will be placed deeper than three feet below final grades and compacted in lifts to achieve the desired density. Additional backfill material will be imported from a clean borrow source of either 3-inch stone or coarse aggregate. Some areas within the RAA may include a layer of fine grained material depending on future use of the RAA.

In general, the final ground surface will be restored to match existing conditions. Final ground surface in select areas within the RAA will either be vegetated or consist of coarse aggregate. For vegetated areas, topsoil, with appropriate seeding and mulch, will be placed on top of the clean backfill. For gravel areas such as access road, a layer of gravel will be placed on top of the clean backfill.

All erosion controls used during construction activities will be removed. A silt fence will be installed along the downgradient edge of the disturbed areas and will remain in-place until vegetation is well established. The temporary chain link fence will be removed once final restoration activities are completed.

5 STATE AND LOCAL REQUIREMENTS

5.1 Storm Water Discharge

The proposed removal action is expected to disturb an area of exceeding one acre. As such, the proposed construction activity is subject to National Pollutant Discharge Elimination System (NPDES) requirements under the jurisdiction of the Illinois IEPA, Division of Water Pollution Control. To ensure compliance with the IEPA's construction site storm water program, the plans and specifications issued for bid by construction contractors will include the following requirements:

- A Notice of Intent (NOI) for General Permit to discharge storm water associated with construction site activities (IEPA Form IL 532 2104) will be prepared and submitted to IEPA. The NOI will a) identify PGL as the site owner, b) provide contact information for the Contractor, c) provide construction site information and description of the proposed work, and d) identify the Sanitary and Ship Canal as the receiving water body for storm water run-off.
- A Storm Water Pollution Prevention Plan (SWPPP) will be developed and submitted to IEPA. The SWPPP will: a) provide a details site description, b) outline the erosion and sediment controls that will be employed, such as erosion stabilization, structural practices and best management practices, and c) storm water management. The SWPPP will be in place prior to the start of construction activity and will be maintained on site during the project work.
- A Notice of Termination (NOT) will be prepared and submitted to IEPA once site conditions are fully stabilized following the completion of construction activities.

5.2 Governmental Coordination

Coordination with the following governmental agencies and authorities will occur during the course of the project:

List of Coordination Points with Governmental Agencies

Item	Governmental Agency/Authority
Approval for excavation and removal of soils within the sewer easement	Chicago Department of Water Management
Authorization to discharge possible MGP impacted groundwater or surface water as part of the removal activities to the local combined sewer system	Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) and/or Chicago Department of Water Management
Storm Water Discharge Authorization	Illinois Environmental Protection Agency, Division of Water Pollution Control

Additional approvals for construction will be secured as needed during construction activities by the affected contractors.

IBS will coordinate with the MWRDGC to obtain the equivalent of a discharge permit for wastewater generated during the work. A Special Discharge Authorization Request (Form SDA-100) in conformance with MWRDGC Environmental Remediation Wastewater Ordinance will be prepared and submitted to MWRDGC for approval.

As an alternate means of wastewater discharge, IBS may request a NPDES permit under the Clean Water Act, 33 U.S.C. 1251, to discharge wastewater into the Chicago Sanitary & Ship Canal from IEPA.

5.3 Off-Site Disposal

MGP-impacted debris and soil is planned to be profiled and disposed at Waste Management's Laraway RDF, located in Elwood, Illinois, a Subtitle D landfill. Currently, the Laraway facility has not been approved by USEPA with respect to the Off-Site Rule. Confirmation of compliance will be obtained prior to use of the Laraway facility, otherwise an alternate approved disposal facility will be selected. As an alternate disposal site, MGP-impacted debris may be disposed of at Waste Management's Countryside Landfill, located in Grayslake, Illinois an operating Subtitle D facility or their CID RDF, located in Calumet City, Illinois, a closed Subtitle C landfill currently approved to accept non-hazardous MGP wastes for bioremediation. The Countryside and CID RDF facilities have been confirmed to be in compliance with the Off-Site Rule for disposal of waste as set forth in the NCP at 40 CFR 300.440.

6 CONSTRUCTION QUALITY ASSURANCE MEASURES

This section describes the following principal construction quality assurance measures that will be employed during the removal action.

- Air Monitoring;
- Fugitive Emissions Management Plan;
- Health and safety; and
- Sampling and analysis.

6.1 Air Monitoring Plan

Soil removal has the potential to produce emissions, including odor, fugitive respirable particulate matter (less than 10 micrometers in diameter, PM_{10}), and vapor phase COCs. Potential sources of emissions include:

- Fugitive dust from soil excavation, staging, handling, and off-site transport; and
- MGP related vapor phase /odor from removal of MGP source material (oil-wetted or oil-coated).

Ambient air monitoring will be performed to document that levels of dust and VOC emissions generated from the removal action do not present a risk to public health or the environment. Air monitoring will be conducted during excavation and backfilling activities to evaluate site conditions at the RAA perimeter, to ensure engineering measures used to control potential source of emissions are effective, determine when response actions are warranted, and document ambient air quality at the perimeter. Specific elements include:

- Establishing a dedicated weather station within the RAA perimeter to be operated continuously (24 hours per day) to monitor meteorological conditions during remedial construction.
- Background air sampling prior to initiating the soil removal operations to establish baseline ambient air concentrations. During soil removal operations, both periodic real-time air monitoring and 12-hour time-weighted sampling will be performed along the perimeter of the RAA.
- SUMMA canisters will be used to collect 6 liter, 12-hour time-weighted average samples for VOC analysis including naphthalene. Results will be compared to the site-specific risk-based acceptable ambient concentrations (AACs) presented in Appendix D.

- Portable equipment will be used to collect continuous 12-hour, PM_{10} average concentration to be compared to the site-specific AAC of 0.15 mg/m^3 (Appendix D).
- Real-time air monitoring data for total volatile organic compounds (TVOCs), benzene, and PM_{10} will be collected periodically during active work periods using portable and handheld equipment for comparison with established Action Levels.

Air monitoring activities will be conducted by an air monitoring technician under the direction of the oversight team leader. Examples of daily field air monitor reports and sample collection logs for the SUMMA canister are provided in Appendix E. Operation and calibration of the portable and handheld equipment will be in accordance with the manufacturer's operation manual.

6.1.1 Time Weighted Average (12-Hour) Perimeter Air Monitoring

The proposed air sampling strategy for 12-hour SUMMA canisters and continuous portable dust sampler is divided into three categories: background monitoring, full-scale startup, and full-scale operations. Each category has distinct sampling frequencies and quantity requirements. Frequencies and quantities may be revised during construction depending on conditions. Sampling requirements include the following:

- Background: prior to startup of full-scale operations, background air sampling and monitoring will be conducted to establish baseline concentrations for comparison with AACs. In addition to periodic real-time monitoring, two events of 12-hour SUMMA samples and continuous 12-hour monitoring of PM_{10} will be collected at one upwind and two downwind locations along RAA perimeter. The SUMMA samples will be analyzed for VOCs including naphthalene (USEPA Method TO-15).
- Full Scale Startup: during the first four weeks of full-scale operation, 12-hour SUMMA samples and continuous monitoring of PM_{10} will be collected at one upwind and two downwind locations along the RAA perimeter. Sampling events will be conducted two times per week. The SUMMA samples will be analyzed for VOCs including naphthalene (USEPA Method TO-15). Priority (3-day) laboratory turnarounds will be requested for rapid assessment of the analytical results.
- Full Scale: during the remaining duration of full scale operations, 12-hour SUMMA samples and continuous monitoring of PM_{10} will be collected once a week at one upwind and two downwind locations along RAA perimeter. The SUMMA samples will be analyzed for VOCs including naphthalene (USEPA Method TO-15)
- With the exception of the first four weeks of full scale startup, samples will be analyzed within the 14-day holding time unless real-time monitoring results indicate that the sample analysis should be expedited to evaluate potential on-site exceedances of AACs.
- Upwind and downwind samples will be located along the RAA perimeter based on remediation activities, accessibility, and weather conditions.
- Field duplicates for the SUMMA canister will be collected at a frequency of one in 20 samples. Duplicates will be obtained by collecting two concurrent samples from a single location and having both analyzed by the laboratory.

6.1.2 Periodic Real-Time Perimeter Air Monitoring with Portable and Handheld Equipment

Periodic real-time air monitoring using portable and handheld devices will be conducted prior to and during the soil removal operations along the RAA perimeter. The frequency and locations for monitoring will be based on site-specific conditions encountered during the removal operations and potential sensitivity of off-site receptors. Key requirements include of the following:

- Total Volatile Organic Compounds (TVOCs) will be monitored periodically during active work periods using a handheld photoionization detector at upwind and downwind locations.
- Benzene will be monitored when sustained concentrations of TVOCs are observed at or above the Action Level using a handheld photoionization detector with a vapor specific separation tube analyzes specifically for benzene at upwind and downwind locations.
- Continuous real-time monitoring for PM10 will be conducted during active work periods and during the 12-hour sampling events using portable DustTrak™ aerosol monitoring equipment, or similar at upwind and downwind locations.
- Qualitative olfactory assessment of odor (e.g., naphthalene) that could indicate a concern for a public nuisance.
- Visual assessment of the presence of off-site fugitive dust due to removal operations.

6.1.3 Assessment of Meteorological Conditions

An on-site meteorological station will be used to measure wind speed, wind direction, relative humidity, ambient air temperature, and barometric pressure. Data will be relayed to a dedicated computer that will receive continuous meteorological data and compute a 5-minute running average of the wind speed and direction. The 5-minute running average wind direction will be used to identify upwind and downwind sample locations and to monitor off-site receptors. The information will be stored electronically and included in daily reports. Average daily temperatures and barometric pressures will be used to calculate 12-hour time-weighted average air sample volumes for the SUMMA canisters. Meteorological data may also be obtained from the National Data Buoy Center (Chicago Station CHII2) in the event of a malfunction of the on-site station.

6.1.4 Action Levels

The Action Levels will be used as a screening tool to manage remediation activities to minimize the potential for off-site emissions. Action levels are generally constrained by detection limits on the field monitoring equipment. In addition, action levels should be at appropriate levels to avoid triggering a

concern from ambient air concentrations (i.e. exhaust from nearby parked cars) versus concerns that could be resulting from the site remedial operations. Exceedance of an Action Level at the RAA perimeter will require a response action by the contractor for vapor phase, particulate and/or odor mitigation based on the conditions presented in Section 6.2.1. The effectiveness of the Action Levels to maintain off-site vapor phase emissions below the AACs will be assessed during the full scale startup and may be adjusted, as appropriate. Proposed Action Levels for periodic real-time perimeter monitoring are summarized in the Table below:

Action Levels

Parameter	Action Level
TVOCs	1.0 part per million (ppm) (15-minute average concentration) greater than background[8]
Benzene	0.5 ppm
PM_{10}	1.0 mg/m^3 (15-minute average concentration) greater than background[8]

These action levels are based on:

- The proposed action level for TVOCs has been used at other MGP sites to effectively predict compliance with AACs and what can be reliably measured using hand held equipment.
- The proposed action level for benzene is based on the on the California EPA Reference Exposure Level for acute 6-hour exposure which is 0.4 ppm.
- The proposed action level for PM_{10} is based on previously demonstrated performance at other MGP sites.

6.2 Fugitive Emissions Management Plan

Action Levels for fugitive air emissions will be used in a tiered approach to determine necessary response actions to different exposure conditions. In addition to the Action Levels provided in Section 6.1.4, a qualitative assessment will be performed for odor at the perimeter of the RAA. An odor Action Level will be defined as conditions perceived to present a public nuisance concern, or a public complaint is received. Particulates will also be assessed qualitatively, in addition to having an established numerical Action Level, based on visible off-site migration.

[8] Background defined as upwind and/or lowest concentration recorded within the RAA.

6.2.1 Emission Conditions

Three Emission Conditions have been developed based on the type and duration of an Action Level exceendace. The three conditions are depicted on Figure 10 and have the following definitions:

- **Emission Condition 1**: Normal or ambient air conditions for either TVOCs or particulates exceed the Action Level. Emission Condition 1 may also be triggered on the basis of odor at the perimeter of the RAA if there is a determination that it could pose a concern as a public nuisance and/or sustained visible off-site dust migration fugitive dust is observed regardless of the TVOC or particulate concentrations. This condition trips a "yellow" flag.

- **Emission Condition 2**: Benzene concentrations exceed the Action Level or particulates continue to exceed the Action Level longer than 15 minutes. Emission Condition 2 will also be triggered if mitigation measures for an Emission Condition 1 are ineffective in reducing odors or visible off-site dust migration. This condition trips an initial "red" flag.

- **Emission Condition 3**: Concentrations continue to exceed an Action Level for an additional 15 minutes after Emission Condition 2 is initiated. Emission Condition 3 will also be triggered if mitigation measures for an Emission Condition 2 are ineffective in reducing odors or visible off-site dust migration. This condition trips a second "red" flag.

Yellow and red flags will be relayed verbally by the air monitoring technician to the oversight team leader and the contractor for response and mitigation measures.

6.2.2 Mitigation Measures

Mitigation measures for fugitive emissions are divided into the following categories:

- Engineering Controls: required engineering controls will consist primarily of the use of Rusmar™ Long Duration Foam (AC-645) or an equal product approved by the Field Engineer. Application produces thick viscous foam for immediate suppression of fugitive emissions. Foam application is not specifically required under Site Condition 1 but may be used on a discretionary basis for control of localized emissions in the RAA. Foam application is required during an Emission Condition 2 to reduce levels to an Emission Condition 1 or lower status. The use of Rusmar AC-900 series may only be required under Emission Condition 3. This foam provides an extended duration and higher level of suppression effectiveness than the Rusmar AC-645.

- Physical Controls: physical controls represent the primary mitigation measures and incorporate a range of activities (e.g., good housekeeping practices, maintaining exclusion zones, and covering stockpiles). In the event that Emission Condition 2 or 3 mitigation measures are required, modifications to the physical controls may include more aggressive activities such as daily covering of stockpiles or continuous use of water for dust suppression.

- Work Sequencing: sequencing the work will limit emissions from freshly exposed soil and the amount of material that may require stockpiling pending further management. Other factors to be considered include planning the operations to avoid double-handling of impacted materials

and scheduling loading and off-site hauling to minimize the duration that staged materials will need to be maintained. In the event that Emission Condition 2 or 3 mitigation measures are required, modifications to the work sequencing may include modifying the rate of excavation or on-site processing to further reduce emissions.

- Site Layout: requirements for site layout include planning by the contractor to locate proposed stockpile and material management areas away from potentially sensitive receptors to the extent practicable. These requirements will also include reassessment of site layout requirements as the remedial operations progress.

6.3 Health and Safety Plan

IBS, contractors, and NRT personnel will be qualified and knowledgeable with respect to health and safety requirements relating to the removal action. A Site-Specific Health and Safety Plan (SSH&S) has been developed for IBS and oversight personnel working at the site during all field activities in general accordance with the USEPA-approved *Multi-Site Health and Safety Plan Revision 2* (Prepared for Integrys, 2007). This plan will be a separate document and will be available upon request if review of the document is required. A copy of the SSH&S plan is included in Appendix C. Project team members will read and be familiar with the plan prior to the commencement of field work.

Contractors retained to conduct the removal action will be required to have a written Health and Safety Plan prior to the start of field activities and shall maintain a copy of the Plan at the site at all times during work activities. The Contractor's Health and Safety Plan will comply with all applicable OSHA regulations including 29 CFR 1910: Occupational Safety and Health Standards and 29 CFR 1926: Health and Safety Regulations for Construction. The plan will, at a minimum, address the following elements:

- Key Personnel
- Air Monitoring
- Health and Safety Risks
- Site Control
- Training Documentation
- Decontamination
- Protective Equipment
- Emergency Response
- Medical Surveillance

Contractor's employees and subcontractors performing work on this project involving excavation, movement or treatment of solid waste or contaminated media will be required to have appropriate training as specified in the OSHA Standards, including HAZWOPER Standard 29 CFR 1910.120. All work is to be performed in Level D as defined by 29 CFR 1910.120, but the contractor will have capability to upgrade to Level C.

6.4 Sampling and Analysis Plan

Soil and wastewater samples will be collected and analyzed in accordance with the following criteria:

- Analysis of environmental media samples will be performed by an analytical laboratory included in the USEPA-approved RI/FS Multi-Site QAPP – Revision 2 (Submitted to the USEPA in 2007). The approved laboratories anticipated for use are STAT Analysis, Pace Analytical, and Test America.
- All samples for laboratory analysis will be collected in laboratory supplied containers.
- Each cooler of samples will contain a temperature blank and trip blank for BTEX (as appropriate) analyzed to demonstrate proper sample preservation and handling, respectively.
- All QA/QC required by the analytical method will be completed. Lab QA/QC summary and chain of custody documentation will be submitted with analytical results.

Details of the anticipated soil and water sampling frequency and analytical methods are included on Table 1.

6.4.1 Pre-Disposal and Post-Amendment Sampling

As mentioned in Section 4.4.2.3, pre-disposal samples will be collected every 750 cubic yards prior to disposal of potential MGP source material above the Subtitle D landfill requirements. For soils requiring amendment, samples will be collected every 300 cubic yards following amendment to document that landfill requirements are met. These samples will be submitted to a laboratory for TCLP benzene analysis.

6.4.2 Overburden Soil Sampling

As mentioned above in Section 4.4.2.4, overburden soils will be segregated and stockpiled every 1,000 cubic yards. A composite sample from each stockpile will be sampled and analyzed for source material screening parameters to determine its potential reuse as backfill material within the RAA.

To ensure representative sampling is achieved, samples will be collected of overburden material and analyzed to verify compliance with source material criteria as discussed in Section 4.4.2.4. The sampling frequency will be based on one sample per 1,000 cubic yards of overburden. This sampling frequency is consistent with standard industry practices and is similar to that approved by USEPA Revion V at other sites such as the Jacobsville Neighborhood Soil Contamination Site, Evansville, Indiana[9].

Overburden soils satisfying both the soil attenuation capacity and soil saturation limit criteria as noted in Table 2 will be used to backfill the removal areas. Soils exceeding either the soil attenuation capacity or the soil saturation limits will be considered MGP source material and disposed of off-site.

6.4.3 Post-Excavation Sampling

Post-excavation samples will be collected from the removal areas to confirm the removal of source materials and to support future RI/FS evaluations. Post-excavation soil samples will include sidewall and floor samples to document residual soil quality at the extent of removal areas. Sidewall samples will be collected every 50 lineal feet around the perimeter of the excavation. Floor samples will be collected from the bottom of the excavation based on an approximate 50 foot grid pattern, with one representative sample collected from each 50 foot by 50 foot grid cell (i.e., one sample per 2,500 sq. ft. of excavation area). This sampling frequency is consistent with standard industry practices and is similar to that approved by USEPA at other sites within Region 5 such as the Hough Place Station, Chicago, Illinois[10].

[9] USEPA, Region 5, Jacobsville Neighborhood Soil Contamination Site, Record of Decision, September 2009.

[10] USEPA, Region 5, Peoples Gas Hough Place Station Site, As-Built Excavation Map, June 2007.

Upon completion of an excavation area, soil samples will be screened to verify that source materials have been removed. The screening will employ the following parameters and criteria:

Post Excavation Screening Criteria

Parameter	*Screening Criteria*[11]
TPH	2,000 mg/kg or as otherwise calculated based on site specific data
Selected COPCs – Organic constituents with Melting Point Less Than 30°C	Default value for Soil Saturation Limit as listed on Table 2 or as otherwise calculated based on site specific data

If the soil samples fail to meet the above criteria, excavation of additional MGP-source material will be conducted in the corresponding area of the RAA.

Once analytical results of the post excavation soil samples demonstrate the removal of source material, the post excavation soil samples will be analyzed for the entire list of COPCs as established in the USEPA-approved RI/FS Multi-Site Conceptual Site Model and Risk Assessment Framework for the purposes of implementing future RI/FS activities associated with the entire Crawford Station MGP site. The entire COPC list includes:

- PVOCs (SW 846 8260)
- PAHs (SW 846 8270)
- Phenol, 4-Methylphenol, 2-Methylphenol and 2,4-Dimethylphenol (SW 846 8270)
- Inorganics - aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, vanadium, zinc (SW 846 6010); mercury (SW 846 7471); and cyanide (SW 846 9012).

[11] As a guideline the TPH screening criteria will be applied consistent with the Illinois TACO regulations for determination of soil attenuation capacity. The TPH screening criteria will be the default value of 2,000 mg/kg or a site specific soil attenuation value determined using the methods allowed under TACO. This determination will also be made based on representativeness of the data within close proximity of the sampled area, along with visual information. For example, an exceedance of one sample out of eight, would not represent source material if no other visual indications of source material exist.

6.4.4 Wastewater

If wastewater is generated, wastewater samples will be collected on a monthly basis in accordance with the MWRDGC's Environmental Remediation Wastewater Ordinance (ERWO) unless directed otherwise by the MWRDGC. Samples will be analyzed for the parameters specified in Appendix A of the MWRDGC ERWO to confirm concentrations are below the discharge limits required by the permit.

7 SCHEDULE

7.1 Schedule for Construction

Construction activities are tentatively scheduled to begin in November 2011, subject to USEPA's review and approval of this RAWP, issuance of a final AOC, and governmental approvals. Property access and contractor availability are not expected to be constraints with respect to the project schedule; however, weather conditions may influence the production rate of the excavation work.

The table below summarizes the anticipated construction schedule based on the planned scope of work described herein.

Preliminary Construction Schedule

Activity	Duration (Weeks)
Target Project Start Date	November, 2011
Mobilization / Site Preparation	3
Excavation/Transport/Disposal	20
Excavation/On-site Amendment/Transport/Disposal	10 (transport only)
Backfill Operations	5
Site Restoration/Close Out	3
Contingency	4
Total Estimated Project Duration	45
Target Completion	Summer 2012

7.2 Completion Report

A Removal Action Completion Report will be submitted to USEPA within 90 days following restoration of the site to document the work performed.

8 REFERENCES

Burns & McDonnell, July 2001, *The Former Crawford Station Manufactured Gas Plant, Properties A & B, Site Investigation Report*, prepared for The Peoples Gas Light and Coke Company.

Burns & McDonnell, April, 2005, Crawford A & B Properties, Summary of Further Delineation Results, prepared for The Peoples Gas Light and Coke Company.

Burns & McDonnell, June 2002, *The Former Crawford Station Manufactured Gas Plant, Property O, Site Investigation Report - DRAFT*, prepared for The Peoples Gas Light and Coke Company.

Burns & McDonnell, March 16, 2011, *Site Investigation Activities at Crawford Parcel O*, prepared for The Peoples Gas Light and Coke Company.

Prepared for Integrys, August 2, 2007, *Multi-Site Health and Safety Plan Revision 2*.

Prepared for Integrys Business Support, LLC, September 4, 2007, *Multi-Site Quality Assurance Project Plan Revision 2.*

Prepared for Integrys Business Support, LLC, September 8, 2008, *Multi-Site Field Sampling Plan Revision 4*.

TABLES

Table 1 - Sampling and Analysis Plan Summary

Removal Action Area - Parcels A, B and O
Crawford Station MGP Site
Chicago, Illinois

Sample Type	Proposed Number Samples[1]	Matrix / Laboratory	Parameter	Method	Estimated Sample Quantity	Field Duplicates[2] (1 extra volume)	MS/MSD[3] (2 extra volumes)	Equipment Blanks[4]	TOTAL[5]	Estimated No. of Containers	Container Type	Minimum Volume	Preservation (Cool All Samples to 4° ± 2°C Unless 'None' Indicated)	Holding Time from Sample Date
Pre-Disposal Samples														
Composite Test Pit Samples Areas with known or suspected landfill acceptance criteria exceedances	40 1 per 750 cubic yards of soils suspected of requiring amendment	solid fixed	TCLP Benzene	1311/8260B	40	2	2	--	44	44	glass	2 oz	zero headspace	14/28 days
Post-Amendment Samples														
Composite Stockpile Samples Stockpiles which exceeded landfill acceptance criteria and were amended	20 1 per 300 cubic yards of soils that have been amended	solid fixed	TCLP Benzene	1311/8260B	20	1	1	--	22	22 sets	glass	2 oz	zero headspace	14/28 days
Overburden Soil Sampling														
Composite Stockpile Samples Surface Soils that are anticipated for reuse as backfill	28 1 per 1,000 cubic yards of soil planned for return to the excavation backfill	solid fixed	TPH GRO	5030/8015B	28	2	2	--	32	32 sets	glass	2 oz	--	14 days
			TPH DRO	3541/8015	28	2	2	--	32	32 sets	glass	2 oz	--	14/40 days
			PVOCs	5035/8260B	28	2	2	--	32	32 sets	glass	2 oz	--	14 days
			PAHs[6]	8270C or 8270 SIM	28	2	2	--	32	32 sets	glass	2 oz	--	14/40 days
			Phenols[7]	8270C	28	2	2	--	32	32 sets	glass	2 oz	--	14/40 days
			Cyanide	9012A	28	2	2	--	32	32 sets	glass	2 oz	--	14 days
			Metals[8]	6020A/7471A	28	2	2	--	32	32 sets	glass	2 oz	--	14/40 days
Post Excavation Soil Sampling														
Walls and Floors of Excavation	120 1 per every 80 feet of wall and 1 per every 6,000 square feet of floor	solid fixed	TPH GRO	5030/8015B	200	10	10	--	220	220 sets	glass	2 oz	zero headspace	14 days
			TPH DRO	3541/8015	200	10	10	--	220	220 sets	glass	2 oz	zero headspace	14/40 days
			PVOCs	5035/8260B	200	10	10	--	220	220 sets	glass	2 oz	methanol	14 days
			PAHs[6]	8270C or 8270 SIM	200	10	10	--	220	220 sets	amber glass	4 oz	--	14/40 days
			Phenols[7]	8270C	200	10	10	--	220	220 sets	amber glass	4 oz	--	14/40 days
			Cyanide	9012A	200	10	10	--	220	220 sets	plastic	16 oz	--	14 days
			Metals[8]	6020A/7471A	200	10	10	--	220	220 sets	plastic	16 oz	--	14/40 days
Wastewater Compliance Sampling														
Effluent discharged to MWRD Sewer	7 1 per month unless otherwise directed by the MWRD	liquid fixed	MWRDGC Appendix A[9]	Various	7	1	1	--	7	7 sets	Various	Various	Various	14 days

(O-TBN/HMS 7/11)

Notes:

1. Proposed number of samples does not include contingency investigation locations.
2. Field duplicates will be collected at a frequency of 1 per 10 or fewer investigative water samples, and 1 per 20 or fewer investigative soil/sediment samples
3. Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a frequency of 1 per group of 20 or fewer investigative water samples or soil samples. Additional volume will be determined by laboratory requirement
4. Equipment blanks will be collected at a frequency of 1 per soil sampling day with non-dedicated sampling equipment. Analyses will be same as soil sample analyse
5. Trip blanks will accompany each cooler containing VOC water samples, including equipment blanks; this is an estimate based on number of days sampling and estimation of number of cooler
6. PAHs as listed in the Multi-Site RAF including naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, ben€pyrene, benzo(a)pyrene, indeno(1,2,3-cd) pyrene, dibenzo(a,h)anthracene, benzo(g,h,i)perylene, 2-methylnaphthalene
7. Phenols as listed in the Multi-Site RAF including 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, phenol
8. Metals as listed in the Multi-Site RAF including aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium and zin
9. Parameters as listed in the MWRDGC Environmental Remediation Wastewater Ordinance Appendix A including cadmium, chromium, copper, cyanide, fats/oils/greases, iron, lead, mercury, nickel, zinc, dichloromethane, chloroform, 1,1,-trichloroethane, trichloroethylene, benzene, tetrachloroethene, toluen ethylbenzene, total VOCs, total toxic organics, pH

Table 2 -Source Material Screening Criteria

Removal Action Area - Parcels A, B and O
Crawford Station MGP Site
Chicago, Illinois

Soil Attenuation Capacity ***Reference 35 IAC Part 742.215***	
Parameter	***Screening Criteria***
Total Petroleum Hydrocarbons (TPH)	2,000 mg/kg; or Site Specific value determined using ASTM D2974-00 per Appendix C, Table F

Soil Saturation Limit ***Reference 35 IAC Part 742.220***				
Parameter[1]	***Melting Point (C)***	***C_{sat} Surface Soils***	***C_{sat} Subsurface Soils***	***Reference***
Benzene	5.5	870	870	TACO Appendix A, Table A
Ethylbenzene	-95	400	400	TACO Appendix A, Table A
Toluene	-93	650	650	TACO Appendix A, Table A
Xylenes (Total)	-47.4	320	320	TACO Appendix A, Table A
1,3,5-Trimethylbenzene	-44.8	186	70.6	IEPA, "Chemicals not in TACO Tier 1 Tables"[2]
1,2,4-Trimethylbenzene	-43.78	409	146	IEPA, "Chemicals not in TACO Tier 1 Tables"
2,4-Dimethylphenol	21	10,563	4,679	Calculated using TACO Equation S-29

[1] The parameters selected for soil saturation limit screening consist of a subset of the COPCs for the site . The parameters selected are those COPCs that are organic constituents with a melting point less than 3 C.
[2] IEPA Website, http://www.epa.state.il.us/land/taco/chemicals-not-in-taco-tier-1-tables.html

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S-29 Csat Calculation $$C_{sat} = \frac{S}{\rho_b} \bullet \left[\left(K_d \bullet \rho_b \right) + \theta_w + \left(H' \bullet \theta_a \right) \right]$$

Site-Wide Parameters					
Parameter	**Symbol**	**Units**	**Source**	**SubSurface**	**Surface**
Dry Soil Bulk Density	ρ_b	g/cm^3	Default-Clay	1.7	1.7
Air-Filled Soil Porosity	θ_a	L_{air}/L_{soil}	Default	0.130	0.280
Water-Filled Soil Porosity	θ_w	L_{water}/L_{soil}	Default	0.300	0.150
Organic Carbon Content of Soil	f_{oc}	g/g	Default	0.002	0.006

Chemical-Specific Parameters				
Contaminant of Concern	**Henry's Law Constant (H') (unitless)**	**Solubility in Water (S) (mg/L)**	**Soil-Water Partition Coefficient (K_d) (cm^3/g)**	**Organic Carbon Partition Coefficient (K_{oc}) (cm^3/g)**
2,4-Dimethylphenol (Surface)	0.000082	7870	1.254	209
2,4-Dimethylphenol (SubSurface)	0.000082	7870	0.418	209

Calculations	
Contaminant of Concern	**Site-Specific $C_{sat\ (mg/kg)}$**
2,4-Dimethylphenol (Surface)	10,563
2,4-Dimethylphenol (SubSurface)	4,679